THE PORT OF NEW YORK AUTHORITY

CREATED BY COMPACT BETWEEN THE STATES OF NEW YORK AND
NEW JERSEY AND RATIFIED BY CONGRESS

FOURTH PROGRESS REPORT

ON

HUDSON RIVER BRIDGE

AT NEW YORK BETWEEN

FORT WASHINGTON AND FORT LEE

MARCH, 1931

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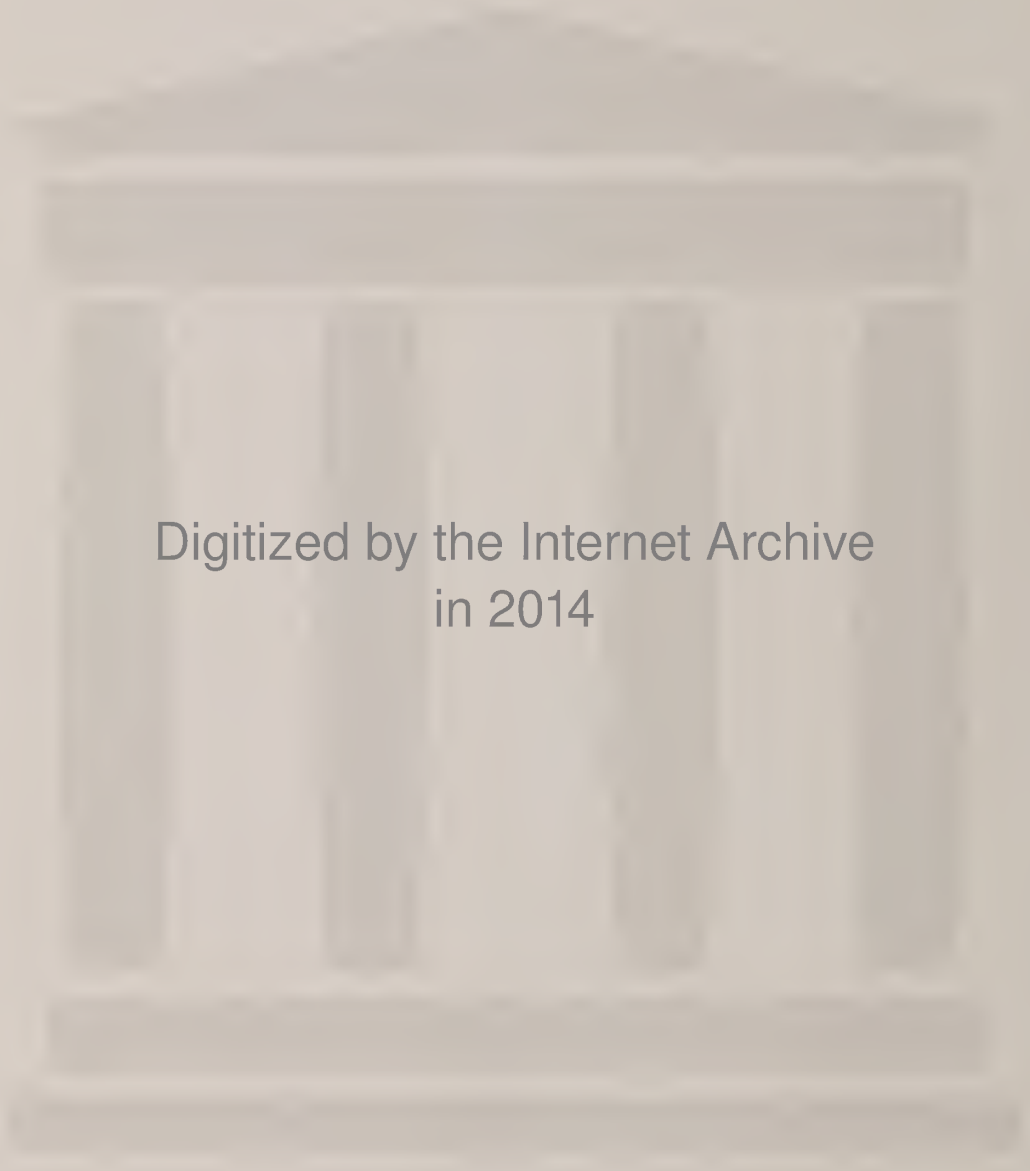
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PROF. CHAS. P. BERKEY

HUDSON RIVER BRIDGE. FLOOR STEEL ERECTION COMPLETED. JANUARY 21, 1931

March 10, 1931

To the Commissioners of the Port of New York Authority

Gentlemen:

Construction work on the Hudson River Bridge is rapidly nearing completion as will be noted from the Fourth Progress Report of the Chief Engineer, included herein.

Since the rendition of the Third Progress Report on April 15, 1930, all of the major items involved have been completed or are well under way. Agreements with the governmental authorities, both in New York and New Jersey, for the approaches have been executed and the construction work involved is progressing rapidly. The cable work (except for the wrapping) has been finished; the floor steel has all been placed; the main arch over Riverside Drive was completed on December 15th; and contract for paving has been let, stipulating July 13, 1931, as the completion date.

Considering the speed with which construction is now being carried on and the relatively small amount which remains to be done, it is confidently expected that the structure will be open to traffic the latter part of 1931.

Additional studies which were made during 1930 of inter-Hudson highway traffic indicate that travel over the Hudson River Bridge will exceed our earlier expectations.

J. E. Ramsey
General Manager

AERIAL VIEW OF HUDSON RIVER BRIDGE. FLOOR PARTIALLY COMPLETED. DECEMBER 16, 1930

HUDSON RIVER BRIDGE
FOURTH PROGRESS REPORT

Report
By the Chief Engineer

March 2, 1931

Mr. J. E. Ramsey, *General Manager*

The Third Progress Report on the Hudson River Bridge was rendered April 1, 1930. Since that time such progress has been made in carrying out the general construction program that it has been possible to advance the schedule of work on the bridge and approaches, and it is now believed that it will be possible to open the bridge to traffic in the latter part of 1931.

At the time of submitting the Third Progress Report, the rock cut for the approach and cable anchorage in New Jersey had been completed, and the construction of the New York anchorage had been finished in its initial stage. The steel towers had been completed; footbridges erected; cable spinning operations well advanced; 26,000 tons, or approximately ninety-two per cent of the total cable wire required, had been manufactured, and over 10,000 tons had been erected. In preparation for the construction of the New York approach, buildings in the four blocks between Riverside Drive and Fort Washington Avenue had been razed. Negotiations were still in progress with the City of New York, the Borough of Fort Lee, the County of Bergen and the State of New Jersey with respect to the plans for the approaches and highway connections on both sides of the river.

At this writing the cables and the floor system for the main structure are complete. Cable spinning operations were advanced sufficiently to permit the erection of the entire floor system before the advent of severe winter weather.

The plans for the approaches and highway connections have been completed and have received the approval of the Governors of the two States and the respective Municipal, County and State Authorities and appropriate agreements covering these plans have been executed.

Five construction contracts covering the major portions of the two approaches in the initial stage have been awarded. Excavation for the main approach ramp on the New York side between the anchorage and Fort Washington Avenue and for the vehicular tunnel in West 178th Street between Fort Washington Avenue and Amsterdam Avenue has been advanced rapidly. The main arch barrel of the span over Riverside Drive has been concreted and the construction of the Riverside Drive connections is well under way. In New Jersey, excavation for the main approach and ramps has been completed to a line west of Hoyt Avenue. Beyond this line the New Jersey State Highway Commission is carrying on excavation and construction under an agreement with the Port Authority in connection

THE HUDSON RIVER BRIDGE. FEBRUARY 25, 1931

with the approach highways. Grading and paving of Hudson Terrace in the vicinity of the approach and the construction of the piers, abutments and retaining walls for the crossing of the bridge approach over Hudson Terrace have been completed.

During the period between April 1, 1930, and March 1, 1931, construction contracts totaling $4,256,711.50 were awarded as follows:

Main Approach Ramp of the New York Approach	$ 746,679.00
Vehicular Tunnel in West 178th Street	1,756,945.00
Riverside Drive Connections of the New York Approach	995,969.00
Excavation and Miscellaneous Construction for the New Jersey Approach	287,651.50
Paving and Miscellaneous Construction for the New Jersey Approach	469,467.00

These contracts, together with those previously awarded, total $30,299,044.81 for construction to date.

THE NEW YORK APPROACH PLAN

The plans for the New York approach are the result of elaborate and detailed studies on the part of the Port Authority Staff and engineering representatives of the City of New York.

An Engineering Committee, composed of Mr. Arthur S. Tuttle, Consulting Engineer of the Board of Estimate and Apportionment of the City of New York, and the Chief Engineer of the Port Authority, rendered two reports on the plans for the New York Approach. The first report recommended the approach plan as far as Broadway and including the Riverside Drive connections. The second of these reports dealt principally with the plan for two vehicular tunnel approaches, one in West 178th Street and one in West 179th Street between the sub-surface plaza at Fort Washington Avenue and the east side of Amsterdam Avenue and recommended modification in the procedure of carrying out the entire approach plan.

The plans were approved by the Board of Estimate and Apportionment, The Port of New York Authority and the Governor of the State of New York.

An agreement between the City of New York and The Port of New York Authority to effectuate the plan for the New York approach was signed July 29, 1930. It embodies all of the various commitments of the parties relative to the approach. Provision is made covering initial construction to be completed before the bridge is opened to traffic. The vehicular tunnel in West 178th Street is to be ready for traffic upon opening of the bridge if possible but in no event later than six months thereafter. The vehicular tunnel in 179th Street will be constructed after the bridge has been opened to traffic.

Among other stipulations certain supplementary approach ramps and plazas are to be built and street widenings are to be completed within two years after the date on which the bridge traffic during the previous twelve months shall have reached ten million vehicles.

As initially constructed the main approach ramp from the anchorage in Fort Wash-

VIEW OF MAIN SPAN FLOOR STEEL ERECTION THROUGH LOWER PORTAL OF
NEW YORK TOWER. DECEMBER 13, 1930

ington Park will provide for a roadway 60 feet in width. It will be carried across Riverside Drive on an arch of 196 foot span. The ramp slopes at a 3.8 per cent grade to approximately street level at Northern Avenue; continuing east beyond Northern Avenue the ramp passes below the ground surface, and west of Fort Washington Avenue widens out to permit connections with the vehicular tunnels to be constructed in West 178th and West 179th Streets. The tunnel in West 178th Street, which is to be completed first, will initially provide for two-way traffic between Fort Washington and Amsterdam Avenues.

At Northern Avenue, where the approach ramp attains street level, entrances and exits are provided for vehicles using Fort Washington Avenue, Broadway and adjacent streets, and connections are made with the off-bound and on-bound roadways for vehicular traffic to and from Riverside Drive. The latter connections parallel 178th and 179th Streets and the main ramp for the block between Northern and Haven Avenues. West of Haven Avenue these roadways turn south, the on-bound roadway passing under the main ramp. Both the off-bound and on-bound roadways branch to permit connections on the east and west side of the Drive. The roadway carrying bridge traffic to and from the west side of Riverside Drive is carried across the Drive by means of a rubble-faced arch of 120 foot span, located approximately opposite West 171st Street. These connections permit trans-Hudson traffic to pass directly to and from Riverside Drive either north-bound or south-bound without crossing traffic on the Drive.

As finally constructed the main approach, from the anchorage to Pinehurst Avenue, will be widened to 145 feet by the addition of a ramp on each side of that initially constructed, the main arch over Riverside Drive being increased in width to accommodate the additional roadways. Vehicles to and from the Riverside Drive connections will then use the additional 30 foot roadways thus provided on the main ramp and will emerge at Pinehurst Avenue rather than at Northern Avenue. The tunnel in West 179th Street will be constructed and the center ramp will be extended up from the sub-surface plaza west of Fort Washington Avenue to provide entrances and exits at Broadway.

THE NEW JERSEY APPROACH PLAN

The plan for the New Jersey Approach and Highway Connections was developed by an Engineering Committee composed of Mr. Jacob L. Bauer, State Highway Engineer, New Jersey State Highway Commission; Mr. R. P. McClave, County Engineer of Bergen County; Mr. S. Wood McClave, Engineer of the Borough of Fort Lee, and the Chief Engineer of The Port of New York Authority.

Briefly, it involves a main approach ramp from the face of the Palisades passing over Hudson Terrace and coming to the surface east of Lemoine Avenue where a spacious plaza with toll collection facilities will be provided. From this plaza direct street connections are made with Lemoine Avenue, Hudson Terrace and intermediate streets. From the easterly side of Hudson Terrace special ramps to the main bridge approach make additional direct connection between that street and the bridge. From the aforementioned plaza the main approach passes westward under Lemoine Avenue and thence continues as a depressed roadway west under Center Avenue, Linwood Avenue and Fletcher Avenue. Between

FLOOR STEEL ERECTION. NOVEMBER 24, 1930

Lemoine and Fletcher Avenues connection is made with State Highway Routes Nos. 1, 4 and 6.

An agreement has been entered into between the State Highway Commission and the Port Authority whereby the portion of the approach west of Lemoine Avenue to its connections with the various State highways will be built by and be under the jurisdiction of the State Highway Commission. The plan and agreement has been approved by the Governor of New Jersey.

TRAFFIC AND REVENUE STUDIES

The annual increase and the geographical distribution of trans-Hudson vehicular traffic was again studied during the year 1930. Despite the general economic depression in 1930, the total trans-Hudson River traffic between the Battery and Yonkers reached a high mark of 25,434,000, a gain of 1,184,000 or eight per cent over the previous year. This figure is more than double the traffic in 1924, and thirty per cent greater than was anticipated six years ago.

Increase in traffic has been most rapid over crossings at and north of 42nd Street,—the region which the Hudson River Bridge will serve most directly. Increase in population and motor vehicle registration has been particularly rapid in the territories lying nearest the bridge. Population increased seventy-three per cent in the Bronx, eighty-two per cent in Westchester County and eighty-two per cent in Bergen County during the ten year period from 1920 to 1930 as compared to the twenty-nine per cent total increase for the Metropolitan district. In the five year period between 1924 and 1929 motor vehicle registrations for Bronx, Westchester and Bergen County increased ninety-five, eighty-seven and one hundred seventy-two per cent respectively as compared to seventy-seven per cent for the Metropolitan district as a whole.

Present estimates of traffic which will use the Hudson River Bridge take into account the effect of the Midtown Hudson Tunnel crossing proposed for the vicinity of 38th Street, Manhattan. Developments have been such during the period subsequent to the rendering of the original traffic estimate in 1926 that it is now believed that the actual Hudson River Bridge traffic will exceed that originally anticipated.

INSPECTION AND RESEARCH

The research work has consisted principally in continuation of the strain measurements started in 1929 to determine the intensity and distribution of stress in the steel members in the New York tower and in the eyebars anchoring the cables in the concrete of the New York anchorage. In addition, measurements have been made on one of the main cables, adjacent to the tower saddle, to determine the magnitude of bending stresses in the cables at this point during the various stages of floor steel erection.

A series of measurements, during construction, have been started to determine deflections and strains in the reinforced concrete arch over Riverside Drive. These tests also include observations of setting and curing temperatures in the arch concrete and contemporaneous laboratory measurements of plastic flow in small reinforced concrete columns.

ARRANGEMENT OF STRANDS IN UNCOMPLETED CABLE. JULY 16, 1930
SPINNING WAS COMPLETED AUGUST 8, 1930

STRANDS AND EYEBAR CONNECTIONS AT THE NEW YORK ANCHORAGE. JULY 16, 1930

CONSTRUCTION WORK

CONTRACTS

The following is a list of the construction contracts under which work has been done in 1930:

Contract HRB-5B—Cables and Anchorage Steel Work
Contractor, John A. Roebling's Sons Company

Contract HRB-5A—Towers and Floor Steel
Contractor, McClintic-Marshall Company

Contract HRB-6 —Main Approach Ramp of the New York Anchorage
Contractor, Cornell Contracting Corporation

Contract HRB-8 —Vehicular Tunnel in West 178th Street
Contractor, Cornell Contracting Corporation

Contract HRB-9 —Riverside Drive Connections of the New York Approach
Contractor, The William P. McGarry Company

Contract HRB-10 —Excavation and Miscellaneous Construction for the New Jersey Approach
Contractor, George M. Brewster & Son, Inc.

Contract HRB-11 —Paving and Miscellaneous Construction for the New Jersey Approach
Contractor, George M. Brewster & Son, Inc.

CABLES AND SUSPENDERS

The construction of the cables was undertaken by the John A. Roebling's Sons Company, the Contractor, during the year 1929. The Third Progress Report described the erection of the necessary working scaffolds or footbridges and the methods and equipment used in spinning the cable wire.

As mentioned in that report, there are four cables arranged in two pairs, 106 feet apart, one pair on each side of the bridge. The cables of each pair are spaced 9 feet center to center.

Each cable is 36 inches in diameter and contains 26,474 parallel steel wires about one-fifth inch (.196 inch) in diameter. These wires are divided into 61 groups, or strands, of 434 wires each, and each strand is attached to a separate pair of eyebars at each anchorage. By the method used to spin the cables, the wires in any one strand are lengths of a continuous wire and are looped around castings at the anchorages. For any one cable four strands were spun at a time in temporary supports adjacent to the cables. Upon completion of each set of four strands the spinning was interrupted until the four completed strands could be seized, or bound at intervals, and placed in final position in the cable. To carry out the spinning and adjusting operations expeditiously three spinning gangs were shifted in cycles from cable to cable. One strand adjusting gang worked in rotation on all four cables.

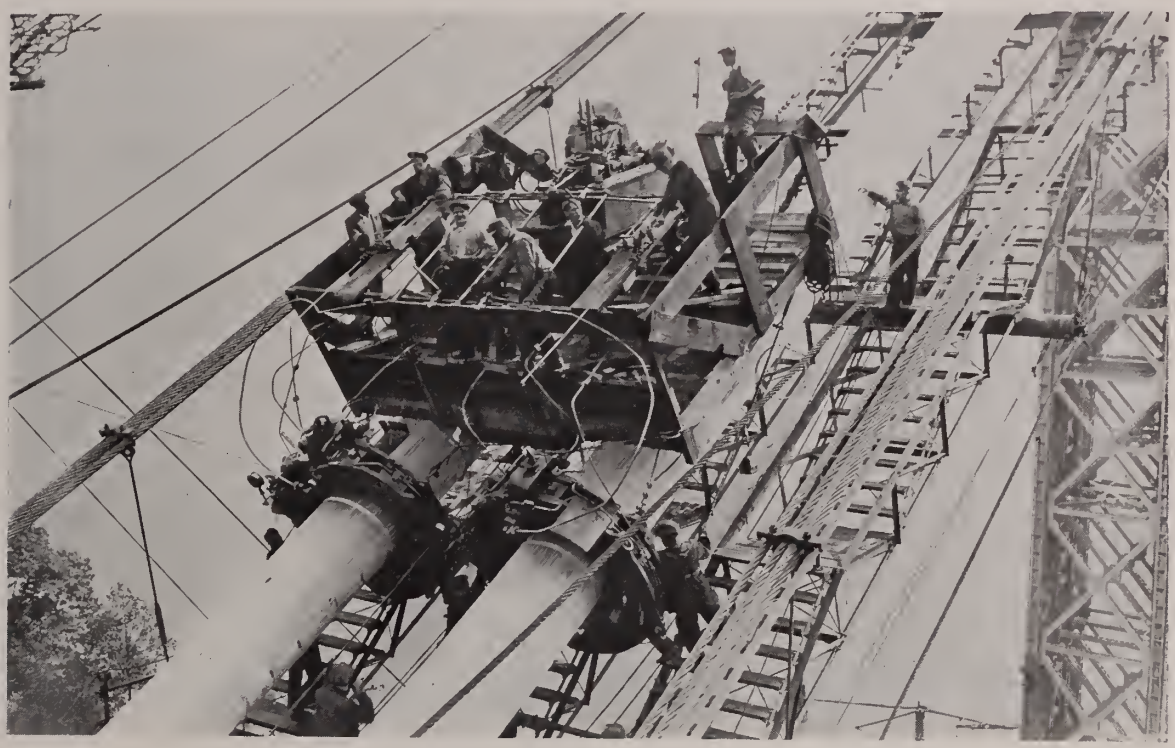
The first wire was put in place October 18, 1929 and the last August 8, 1930. The wire required to build the four cables amounted to 28,307 tons. Preparations were made for

PRELIMINARY CABLE COMPACTOR WITH SIX RADIALLY MOUNTED HYDRAULIC JACKS OF 20 TONS CAPACITY EACH

FINAL CABLE COMPACTORS WITH TWELVE RADIALLY MOUNTED HYDRAULIC JACKS OF 50 TONS CAPACITY EACH

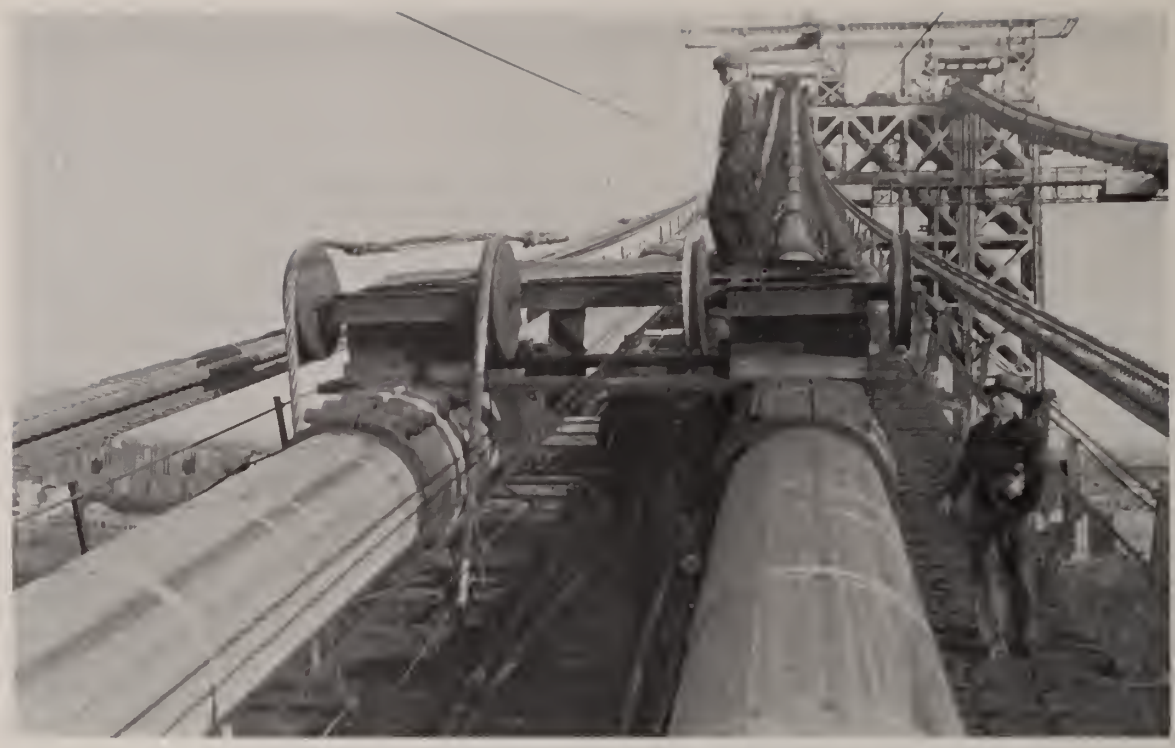
compacting the cables and assembling the suspender cutting and socketing equipment so that this work could proceed immediately upon completion of the spinning.

The cables were compacted or squeezed in two stages. The preliminary squeezing which was done with two light compactors served to reduce the hexagonal section of the cables to an approximately circular section. Each light compactor consisted of a hexagonal frame with six radially mounted hydraulic jacks of twenty tons capacity each. Jack pressure was applied to the cable by the use of steel shoes having inside faces shaped to fit partially the three strands at each corner of the hexagonal cable. On the side of the frame was mounted an additional hydraulic jack for tightening around the cable a steel seizing band at each



FINAL CABLE COMPACTORS IN THE NEW JERSEY SIDE SPAN

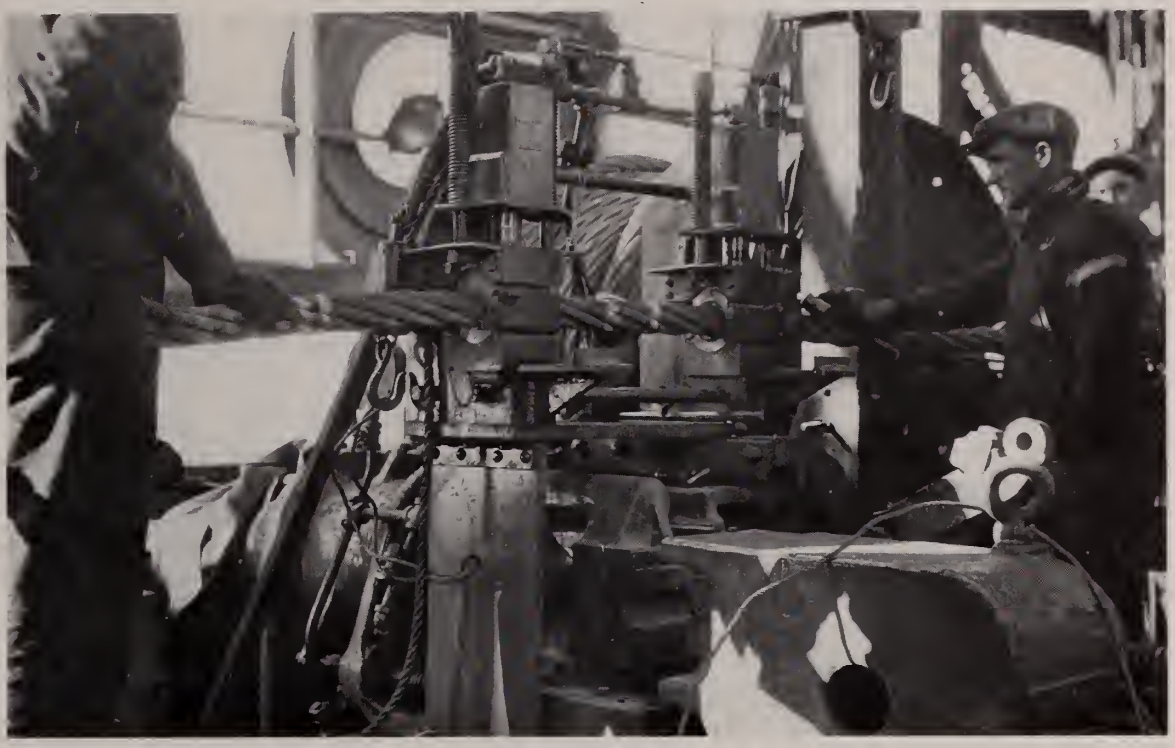
point of application of the squeezer. Each compactor was mounted on a structural steel carriage, with wooden wheels which rode directly on the cable. The carriage held the hand pumps for operating the hydraulic jacks. It was moved along the cable by means of a hoisting engine located at the anchorage. The squeezing in every case started adjacent to the towers and progressed at 100 foot intervals to the anchorages or center of main span, and returned at 5 foot intervals. This preliminary squeezing was done as far as possible at night when the temperature of the cable wire in the top and bottom of the cable was more uniform and the strands correspondingly uniform in length. It was started on July 31st and completed on August 14th of last year.



ERECTING A SUSPENDER ROPE IN THE MAIN SPAN. ENDS PASSING OVER WOODEN SHEAVES

LOWERING THE SUSPENDER ROPE INTO POSITION

The final squeezing followed after the preliminary squeezing had been completed on a pair of cables in each span. The final compactors, eight in number, were similar to the preliminary compactors. They were, however, much heavier and contained twelve hydraulic jacks of 50 tons capacity each, mounted radially, which pressed against steel shoes, the inside faces of which were machined to form a circle 36 inches in diameter. In the main span each of four large structural carriages with wooden wheels designed to ride on a pair of cables carried two compactor frames mounted at one end. An electrically driven hydraulic pump was mounted on each carriage. The carriages were propelled by the tramway or hauling ropes used during the spinning operation. The final compacting started at



AT TOWER TOP. MACHINE FOR CUTTING SUSPENDER ROPE

the center of the main span and at the anchorages in the side spans and progressed toward the towers, compacting the cables at intervals varying from two to four feet as necessary to obtain as nearly as possible a uniform diameter of 36 inches. Seizing bands were placed at each application of the compactor. The final squeezing was started on August 12th and completed on September 20th.

Following the compacting, the cast steel cable bands, over which the suspenders are hung, were placed on the cables. The bands are made in two halves. When erected the two halves completely encircle the cable and are held in fixed position by the friction developed between the casting and the cable when the two halves are drawn up tightly by means of heat treated high strength bolts. In the main span the castings were skidded to position

HUDSON RIVER BRIDGE. FLOOR STEEL ERECTION. DECEMBER 10, 1930

along the footbridge decking and erected by means of chain hoists and timber frames. In the side spans the cable bands were transported from the anchorages to their final positions by carriages which operated on the cables.

With the cable bands in position, the load of the footbridges was then transferred from the temporary cables formed by two groups of nine 2⅞ inch diameter wire ropes to the main cables, after which the footbridge ropes were freed and lengthened one at a time by the insertion of a short connection called a pennant line at each tower. While supported and hanging freely suspended the calculated suspender lengths were then measured under a condition of known stresses. This measuring was done at night in order to secure the advantage of uniform temperature. After measuring, the ropes were lowered until they rested on the footbridges. The main span ropes were cut near the center of the span and the parts were wound on reels at the towers. The side span ropes were then released from their attachments at the anchorages and also reeled at the towers.

TRAVELERS ERECTING FLOOR STEEL IN MAIN SPAN. DECEMBER 10, 1930

Two suspender ropes loop over each cable band and thus provide four socketed ends for attachment to the floor. The process of converting the footbridge ropes into suspenders involved the cutting and socketing of approximately thirty-five miles of wire rope into 592 suspenders of various lengths.

Efficient cutting and socketing plants were located at the top of each tower. A system of handling was developed which exposed both ends of each suspender for the cutting and socketing operations while retaining the looped portion or "bight" on the reel.

FLOOR STEEL ERECTION. VIEW FROM NEW JERSEY TOWER. DECEMBER 10, 1930

To transport and place in its final position on the cable each suspender was unreeled at the tower tops, ends first, one at either side of the cable, with loop or "bight" coming off the reel last, and was then slid along the footbridge and cable to its proper cable band where the socketed ends were passed over large wood-lined sheaves and lowered into vertical position. In general, the suspender ropes were erected first at the bands adjacent to the towers in order that work might be undertaken on the steel floor at the earliest possible date.

The wrapping of the cables which will complete the work under the cable contract will be done during the present year after the concrete roadway slabs are in place. The addition of load on the structure causes elastic stretch in the cables. It is desirable to have the greater part of the elongation take place before the wrapping is applied.

NEW JERSEY SIDE SPAN FLOOR STEEL, FEBRUARY 3, 1931

ERECTION OF STEEL FLOOR STRUCTURE

The construction of the steel floor is part of the contract under which the towers were erected, the McClintic-Marshall Company being the Contractor.

As designed the floor structure will ultimately carry traffic on two levels, in which condition the upper level will carry eight lanes of vehicular traffic and two sidewalks and the lower level will carry four lines of rapid transit.

Initially the upper deck only is erected. However, all the necessary connections are provided for the future addition of the lower deck and stiffening trusses. Main transverse floor beams are located at panel points spaced at 60 foot intervals and are joined by eight longitudinal roadway stringers in each panel. On these stringers are secondary transverse beams at 5 foot intervals which support bulb beams forming the reinforcement of the con-

METHOD OF ATTACHING SUSPENDER ROPES TO FLOOR BEAM

ATTACHING SUSPENDER ROPES TO FLOOR BEAM AT CENTER OF MAIN SPAN. DECEMBER 26, 1930

crete slabs. A fascia stringer and a longitudinal beam adjacent to the roadway curb support the sidewalk beams. The steel work is stiffened against lateral wind movement by the customary cross laterals connected to wind chords. The latter will form the top chords of the stiffening trusses when the lower deck is added.

The erection of the floor steel at the towers was started on September 12, 1930. A boom was assembled on the lower portal of each tower and by this means the floor steel lying within the tower was erected. Two standard "A" frame travelers, each designed to handle a load of about forty tons at a distance of 60 feet, were then assembled side by side on the steel work at each tower. On the New York side these travelers were operated with electric hoists formerly used for tower erection. On the New Jersey side the travelers were operated with gasoline hoists.

ERECTING NEW JERSEY SIDE SPAN FLOOR STEEL. JANUARY 2, 1931

These travelers erected the steel work in the main span, proceeding from the towers toward the center of the river, hoisting the steel directly from carfloats anchored in the river and moving ahead upon completion of each panel. In every case the first piece erected was the main floor beam weighing about sixty-five tons, which was lifted by the two travelers and attached to the suspender ropes. The remaining members were then erected by the travelers working independently. The first suspended steel work was erected on October 28, 1930. The last panel was erected at the center of the main span on December 29, 1930.

After the main span travelers had advanced a few panels from the towers, the side span

GENERAL VIEW OF NEW YORK ANCHORAGE, APPROACH CONSTRUCTION AND EXCAVATION FROM THE NEW YORK TOWER. DECEMBER 13, 1930

travelers were assembled. One of the stiff leg derricks previously used on the towers was used for each. For operation electric hoists located on the ground were used. As the side spans are over land, the members were hoisted from carfloats to the floor level near the towers by means of additional derricks and placed on trucks. The members were thus carried over the floor steel to a position within reach of the erection traveler which lifted each member, swung it forward and set it in position.

The side span erection operations were slower than those of the main span. Two or three days were required to erect each side span panel as compared to a day required to erect a main span panel. The erection of the New Jersey side span was completed on January 8, 1931; the New York side span on January 21, 1931.

CONSTRUCTION OF THE MAIN ARCH OVER RIVERSIDE DRIVE. FEBRUARY 1, 1931

THE NEW YORK APPROACH

The Main Approach Ramp and Tunnel in West 178th Street

Contracts for the construction of the main approach ramp, Contract HRB-6, and the tunnel in West 178th Street, Contract HRB-8, were executed with the Cornell Contracting Corporation on August 7, 1930.

The arch which carries the approach ramp across Riverside Drive is of reinforced concrete. In general, the ramp structure is of reinforced concrete with steel superstructure supporting a concrete roadway.

NEW YORK APPROACH RAMP EXCAVATION. VIEW FROM FORT WASHINGTON AVENUE.
DECEMBER 13, 1930

EXCAVATION FOR TUNNEL RAMP AND SUBSURFACE PLAZA. VIEW LOOKING EAST FROM
PINEHURST AVENUE TO FORT WASHINGTON AVENUE. JANUARY 8, 1931

Construction of the arch over Riverside Drive was started September 2, 1930. Forms for the arch barrel were carried on a falsework of steel columns and girders, which will later be used in the main approach structure. The falsework columns were supported upon concrete foundations, with jacks provided to facilitate removal. The arch barrel which is of reinforced concrete is 4 feet thick at the crown and 7 feet 6 inches thick at the haunches. It was divided into nine segments and ten keys for concreting, each segment and each key extended the full 71 foot width of the arch. In order to place the concrete a timber ramp was built from the vicinity of Haven Avenue to the crown of the arch. Concrete was deposited by means of short chutes from cars operating on the ramp. The concreting of the arch was completed December 15, 1930.

Excellent progress has been made in constructing the concrete footings and columns west of Haven Avenue. Concreting on Contract HRB-6, which involves fifteen thousand cubic

DECKING OVER APPROACH TUNNEL EXCAVATION IN WEST 178TH STREET. LOOKING WEST FROM AMSTERDAM AVENUE. JANUARY 8, 1931

yards, is over forty-five per cent completed. The shop work on the one thousand and fifty tons of structural steel required on the contract is rapidly nearing completion.

East of Northern Avenue a depressed ramp continues to Fort Washington Avenue and will provide access to the tunnels to be located in West 178th and West 179th Streets. Excavation of the ramp has been practically completed.

The usual methods of subway construction are being followed in West 178th Street. In each block excavation is started in one half of the width of the street and carried to a depth

THE NEW JERSEY APPROACH AND SIDE SPAN. VIEW FROM THE NEW JERSEY TOWER
FEBRUARY 1, 1931

of about ten feet, after which decking is placed over the area before excavation is started in the other half of the street. The second stage of excavation is carried on beneath the decking. Ramps have been provided near Broadway and near Amsterdam Avenue to permit trucks to remove the excavated materials. At the present time excavation under the contract is more than half completed.

In addition to the work mentioned, the contracts include certain paving, grading and repaving, relocation of service facilities, and other appurtenant work.

The Riverside Drive Connections

The contract for the construction of the Riverside Drive Connections, Contract HRB-9, was awarded to the Wm. P. McGarry Company and executed on October 14, 1930.

The contract consists largely in the construction of roadways roughly parallel with and east of Riverside Drive between West 178th Street and West 168th Street, the construction of a reinforced rubble and granite faced concrete arch of 120 foot span over Riverside Drive approximately opposite West 171st Street and the construction of a section of the approach roadway south of that point and west of Riverside Drive. Construction of various rubble and rubble-faced walls is included in this work. In the vicinity of West 178th Street the roadways are supported upon a concrete structure; at other points, excavation or fill are required.

The west abutment of the arch, which extends to rock at a depth of 45 feet below the original ground surface, has been concreted. Wall footings south of the abutment are in place and the rubble faced retaining wall is under construction. Excavation and concrete work are in progress in the vicinty of West 178th Street and Haven Avenue.

THE NEW JERSEY APPROACH

Under an earlier contract, HRB-3, the New Jersey approach ramp was excavated from the face of the Palisades to a point east of Hudson Terrace where the approach grade comes to ground surface. A contract, which was undertaken and completed during 1930, provided for the excavation and fill to a limit line established west of Hoyt Avenue, the grading of Hoyt Avenue and the grading and paving of Hudson Terrace in the vicinity of the approach and the construction of the piers, abutments and retaining walls for the crossing of the bridge approach over Hudson Terrace.

The excavation included the plaza area west of Hudson Terrace, the cutting of the two ramps from the plaza to Hudson Terrace, the lowering of the present grade at Hudson Terrace and the cutting of two ramps east from Hudson Terrace to the approach excavation completed under an earlier contract. Two granite faced abutments and three concrete piers were constructed at Hudson Terrace.

The contract for this work was executed with George M. Brewster & Son, Inc., July 3, 1930. The Contractor prosecuted the work vigorously and completed it with minor exceptions on January 7, 1931, approximately two months in advance of contract time.

The work necessary to complete the New Jersey approach including paving of the

NEW JERSEY APPROACH CONSTRUCTION AT HUDSON TERRACE. JANUARY 21, 1931

PLAZA AREA WEST OF HUDSON TERRACE, FORT LEE. JANUARY 21, 1931

approach, a steel viaduct over Hudson Terrace, construction of walls, installation of railings, etc., but excepting the toll booths, lighting fixtures and electrical wiring, is included under Contract HRB-11 which was awarded in January, 1931 to George M. Brewster & Son, Inc. The work is now in progress and is expected to be completed by September 1, 1931.

The excavation and construction between the limit line west of Hoyt Avenue and the west side of Lemoine Avenue is being done by the New Jersey State Highway Commission for the Port Authority, the cost of construction of this section being borne by the latter.

ACKNOWLEDGMENTS

The Port of New York Authority Staff has had the advice and assistance of numerous agencies and individuals. Many of those mentioned in previous reports have materially assisted in the work during the past year.

The continued hearty cooperation of the Palisades Interstate Park Commission is gratefully acknowledged.

The Hon. Walter R. Herrick, Commissioner of Parks of the City of New York, and his Staff have materially assisted in matters relating to the construction work in the Fort Washington Park area.

In the continued development of the New York approach plan and in the facilitation of construction operations the cooperation of Mr. Arthur S. Tuttle, Consulting Engineer of the Board of Estimate and Apportionment of the City of New York; Mr. Clifford M. Pinckney, Chief Engineer of the Borough of Manhattan; Mr. Robert Ridgway, Chief Engineer of the Board of Transportation; Mr. Edward A. Byrne, Chief Engineer of the Department of Plant and Structures; Col. J. R. Slattery, Deputy Chief Engineer of the Board of Transportation; and the Hon. John J. Dietz, Commissioner; Mr. Nicholas J. Kelly, Chief Engineer of Light and Power; Mr. William W. Brush, Chief Engineer, Bureau of Water Supply; all of the Department of Water Supply, Gas and Electricity; and numerous other officials of New York City Departments is acknowledged.

Mr. Jacob L. Bauer, State Highway Engineer, New Jersey State Highway Commission; Mr. R. P. McClave, County Engineer of Bergen County, and Mr. S. Wood McClave, Engineer, Borough of Fort Lee, have cooperated in the development and construction of the New Jersey approach.

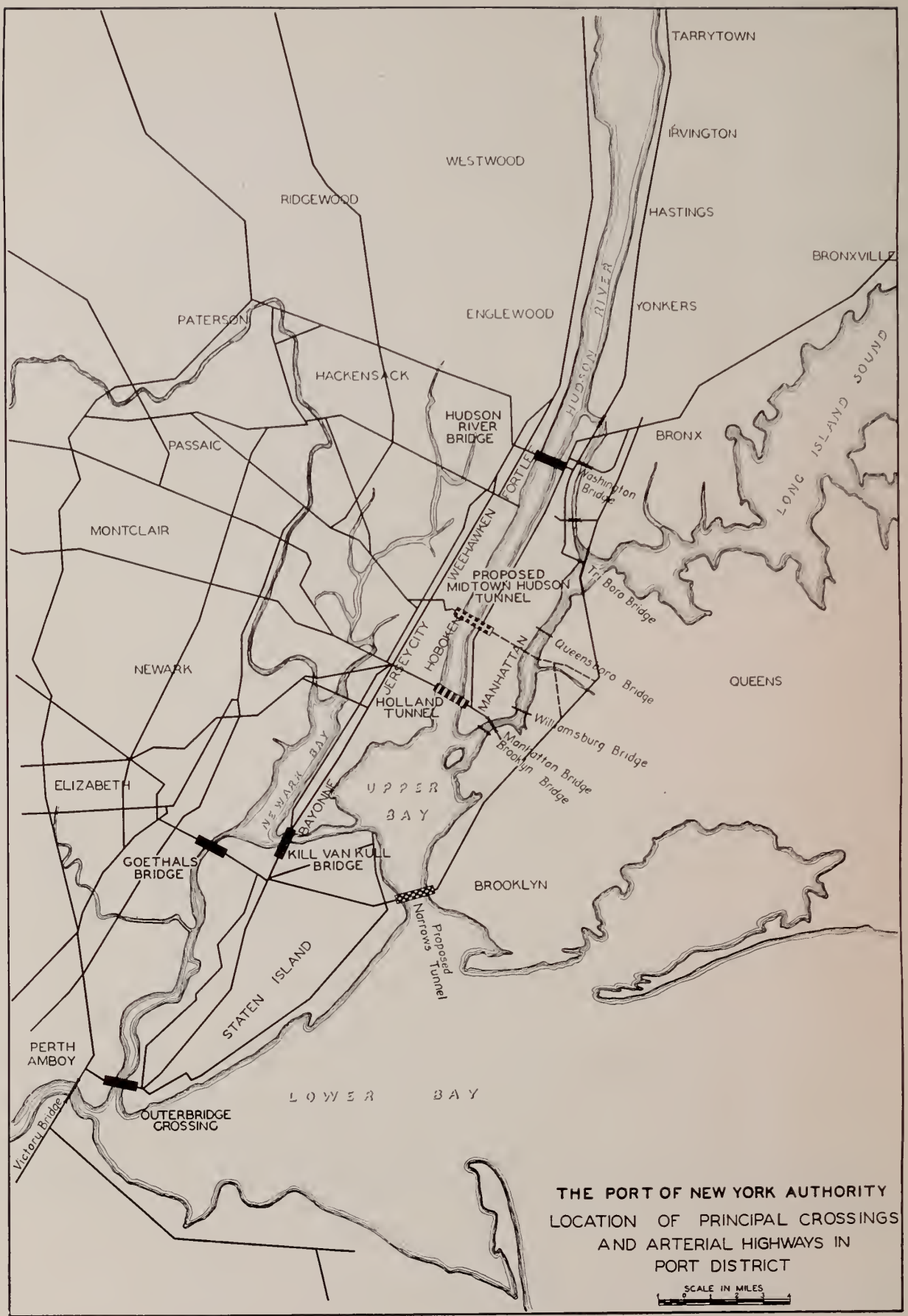
Officials and members of the Public Utility Companies in both New York and New Jersey have likewise rendered valuable assistance.

The high standard of the construction which has been maintained in the Hudson River Bridge work from the beginning has been continued. For the excellent results obtained acknowledgment is made to all of the Contractors named elsewhere herein.

The valuable advice of the Architect and the Consulting Engineers and the hearty cooperation of the members of the Port Authority Staff is appreciated and acknowledged.

Respectfully submitted,

(Signed) O. H. Ammann
Chief Engineer


TARRYTOWN
IRVINGTON
WESTWOOD
RIDGEWOOD
HASTINGS
BRONXVILLE
HUDSON RIVER
YONKERS
ENGLEWOOD
PATERSON
HACKENSACK
HUDSON RIVER BRIDGE
PASSAIC
BRONX
LONG ISLAND SOUND
Washington Bridge
PORTLE
WEEHAWKEN
MONTCLAIR
PROPOSED MIDTOWN HUDSON TUNNEL
Tri Boro Bridge
JERSEY CITY
HOBOKEN
MANHATTAN
Queensboro Bridge
NEWARK
QUEENS
HOLLAND TUNNEL
Williamsburg Bridge
Manhattan Bridge
Brooklyn Bridge
NEWARK BAY
BAYONNE
UPPER BAY
ELIZABETH
GOETHALS BRIDGE
KILL VAN KULL BRIDGE
BROOKLYN
Narrows
Proposed Tunnel
STATEN ISLAND
PERTH AMBOY
LOWER BAY
OUTERBRIDGE CROSSING
Victory Bridge
THE PORT OF NEW YORK AUTHORITY
LOCATION OF PRINCIPAL CROSSINGS AND ARTERIAL HIGHWAYS IN PORT DISTRICT
SCALE IN MILES
0 1 2 3 4

TABULATION OF BIDS FOR MAIN APPROACH RAMP—NEW YORK APPROACH

CONTRACT HRB-6

Received July 14, 1930

Item	Description	Quantities for Comparison	Cornell Cont. Corp.		Geo. Colon Const. Co.		Poirier & McLane Corp.		Larocco Const. Co.		P. T. Cox Cont. Co.		Del Balso Const. Corp.		Thos. Crimmins Cont. Co.		Arthur McMullen Co.		J. F. Murphy Cont. Co.	
			Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Excavation	18,000 cu. yds.	$ 1.50	$ 27,000.00	$ 5.89	$106,020.00	$ 7.00	$126,000.00	$ 6.22	$111,960.00	$ 4.00	$ 72,000.00	$ 3.80	$ 68,400.00	$ 8.00	$144,000.00	$ 9.00	$162,000.00	$10.00	$180,000.00
2	Concrete, except that specified in Items 9, 10 and 21	15,000 cu. yds.	16.40	246,000.00	12.96	194,400.00	13.00	195,000.00	13.06	195,900.00	21.20	318,000.00	25.00	375,000.00	21.80	327,000.00	23.00	345,000.00	28.00	420,000.00
3	Cement, mixed in concrete, except the concrete specified in Items 9, 10 and 21	22,500 bbls.	2.50	56,250.00	2.35	52,875.00	2.50	56,250.00	5.00	112,500.00	3.00	67,500.00	2.50	56,250.00	3.30	74,250.00	2.60	58,500.00	2.80	63,000.00
4	Granite, except that specified in Item 5	340 cu. yds.	170.00	57,800.00	193.00	65,620.00	180.00	61,200.00	224.00	76,160.00	210.00	71,400.00	190.00	64,600.00	186.30	63,342.00	240.00	81,600.00	225.00	76,500.00
5	Granite block pavement, including mortar bed	5,500 sq. yds.	5.00	27,500.00	5.65	31,075.00	7.25	39,875.00	6.30	34,650.00	5.50	30,250.00	5.20	28,600.00	6.00	33,000.00	6.25	34,375.00	6.00	33,000.00
6	Rubble masonry walls	700 cu. yds.	18.00	12,600.00	10.80	7,560.00	14.00	9,800.00	9.50	6,650.00	8.00	5,600.00	7.00	4,900.00	12.00	8,400.00	15.00	10,500.00	10.00	7,000.00
7	Rubble masonry facing	140 cu. yds.	40.00	5,600.00	16.20	2,268.00	25.00	3,500.00	30.00	4,200.00	16.00	2,240.00	15.00	2,100.00	40.00	5,600.00	27.00	3,780.00	30.00	4,200.00
8	Hollow tile walls	3,400 sq. ft.	0.40	1,360.00	0.50	1,700.00	0.65	2,210.00	0.55	1,870.00	0.70	2,380.00	0.50	1,700.00	0.65	2,210.00	0.60	2,040.00	1.00	3,400.00
9	Gunite walls	49,000 sq. ft.	0.90	44,100.00	0.90	44,100.00	0.90	44,100.00	1.00	49,000.00	0.73	35,770.00	0.90	44,100.00	0.90	44,100.00	1.00	49,000.00	1.10	53,900.00
10	Gunite coating	11,000 sq. ft.	0.30	3,300.00	0.30	3,300.00	0.27	2,970.00	0.30	3,300.00	0.20	2,200.00	0.28	3,080.00	0.285	3,135.00	0.36	3,960.00	0.40	4,400.00
11	Structural steel	2,100,000 lbs.	0.055	115,500.00	0.044	92,400.00	0.0417	87,570.00	0.049	102,900.00	0.045	94,500.00	0.06	126,000.00	0.045	94,500.00	0.06	126,000.00	0.05	105,000.00
12	Reinforcing rods	1,600,000 lbs.	0.05	80,000.00	0.049	78,400.00	0.05	80,000.00	0.04	64,000.00	0.055	88,000.00	0.045	72,000.00	0.06	96,000.00	0.06	96,000.00	0.05	80,000.00
13	Reinforcing trusses	83,000 lin. ft.	0.20	16,600.00	0.25	20,750.00	0.25	20,750.00	0.25	20,750.00	0.27	22,410.00	0.30	24,900.00	0.26	21,580.00	0.27	22,410.00	0.30	24,900.00
14	Cast steel	4,300 lbs.	0.15	645.00	0.20	860.00	0.10	430.00	0.18	774.00	0.15	645.00	0.15	645.00	0.15	645.00	0.15	645.00	0.30	1,290.00
15	Cast iron, except that specified in Items 17, 18 and 27 and that involved in construction of water mains (Item 28).	49,000 lbs.	0.06	2,940.00	0.12	5,880.00	0.04	1,960.00	0.11	5,390.00	0.05	2,450.00	0.08	3,920.00	0.10	4,900.00	0.09	4,410.00	0.10	4,900.00
16	Wrought iron pipe	24,000 lbs.	0.06	1,440.00	0.25	6,000.00	0.17	4,080.00	0.21	5,040.00	0.40	9,600.00	0.25	6,000.00	0.25	6,000.00	0.35	8,400.00	0.15	3,600.00
17	16" cast iron pipe	180 lin. ft.	8.00	1,440.00	7.00	1,260.00	8.00	1,440.00	6.50	1,170.00	5.20	936.00	6.00	1,080.00	3.93	707.40	5.00	900.00	5.00	900.00
18	24" cast iron pipe	250 lin. ft.	13.00	3,250.00	10.00	2,500.00	10.00	2,500.00	12.30	3,075.00	8.95	2,237.50	10.00	2,500.00	6.85	1,712.50	8.00	2,000.00	7.00	1,750.00
19	18" vitrified clay pipe	240 lin. ft.	8.00	1,920.00	1.50	360.00	4.00	960.00	9.00	2,160.00	4.30	1,032.00	4.00	960.00	2.50	600.00	4.00	960.00	4.00	960.00
20	20" vitrified clay pipe	140 lin. ft.	9.00	1,260.00	1.75	245.00	5.00	700.00	10.00	1,400.00	5.30	742.00	6.00	840.00	3.20	448.00	5.00	700.00	5.00	700.00
21	3'6"x2'4" concrete sewer	1,010 lin. ft.	14.00	14,140.00	15.85	16,008.50	15.00	15,150.00	21.00	21,210.00	36.60	36,966.00	30.00	30,300.00	24.50	24,745.00	25.00	25,250.00	18.00	18,180.00
22	3½" fibre conduits	7,800 lin. ft.	0.35	2,730.00	0.45	3,510.00	0.20	1,560.00	0.65	5,070.00	0.69	5,382.00	0.40	3,120.00	0.65	5,070.00	0.25	1,950.00	2.00	15,600.00
23	3½" galvanized steel conduits	2,700 lin. ft.	1.50	4,050.00	1.66	4,482.00	1.50	4,050.00	1.15	3,105.00	2.77	7,479.00	1.50	4,050.00	3.50	9,450.00	2.00	5,400.00	2.50	6,750.00
24	3" galvanized steel conduits	1,200 lin. ft.	1.40	1,680.00	1.15	1,380.00	1.20	1,440.00	1.00	1,200.00	2.39	2,868.00	1.20	1,440.00	3.00	3,600.00	1.75	2,100.00	2.50	3,000.00
25	2" galvanized steel conduits	160 lin. ft.	0.70	112.00	1.02	163.20	1.00	160.00	0.50	80.00	1.11	177.60	1.00	160.00	2.00	320.00	1.50	240.00	2.00	320.00
26	1" galvanized steel conduits	30 lin. ft.	0.40	12.00	1.52	45.60	1.00	30.00	0.30	9.00	1.11	33.30	1.50	45.00	0.75	22.50	1.50	45.00	2.00	60.00
27	Relaying 12" cast iron pipe, except that involved in the construction of water mains (Item 28)	980 lin. ft.	2.50	2,450.00	3.00	2,940.00	3.00	2,940.00	3.00	2,940.00	2.65	2,597.00	4.00	3,920.00	1.50	1,470.00	3.50	3,430.00	5.00	4,900.00
28	Construction of water mains, except excavation and reinforced concrete construction	Lump Sum	15,000.	15,000.00	25,000.	25,000.00	15,000.	15,000.00	10,700.	10,700.00	10,500.	10,500.00	16,000.	16,000.00	11,025.	11,025.00	15,000.	15,000.00	35,000.	35,000.00
	Total estimated contract price			746,679.00		771,102.30		781,625.00		847,163.00		895,895.40		946,610.00		987,832.40		1,066,595.00		1,153,210.00

TABULATION OF BIDS FOR VEHICULAR TUNNEL IN WEST 178th STREET—NEW YORK APPROACH

CONTRACT HRB-8

Received July 14, 1930

Item	Description	Quantities for Comparison	Cornell Cont. Corp.		Arundel Corp.		Silas Mason and Co.		Triest Cont. Corp.		La Rocco Const. Corp.		Del Balso Const. Corp.		Arthur McMullen Co.		Rodgers & Haggerty		Rosenthal Eng. Cont. Co., Inc.		Paul J. Moranti and Co., Inc.		Rossof Subway Const. Co.	
			Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Excavation	131,000 cu. yds.	$ 5.80	$759,800.00	$ 5.12	$670,720.00	$ 7.00	$917,000.00	$ 7.50	$982,500.00	$ 7.87	$1,030,970.00	$ 9.35	$1,224,850.00	$ 7.50	$982,500.00	$11.50	$1,506,500.00	$11.80	$1,545,800.00	$13.00	$1,703,000.00	$10.96	$1,435,760.00
2	Structural Steel	6,700,000 lbs.	.05	335,000.00	.046	308,200.00	.05	335,000.00	.05	335,000.00	.04625	309,875.00	.0475	318,250.00	.06	402,000.00	.0505	338,350.00	.0675	452,250.00	.06	402,000.00	.05	335,000.00
3	Concrete, except that specified in Items 5, 6, 7, 28 and 29	25,000 cu. yds.	11.00	275,000.00	15.70	392,500.00	14.20	355,000.00	14.55	363,750.00	11.75	293,750.00	14.00	350,000.00	20.00	500,000.00	19.00	475,000.00	16.00	400,000.00	13.35	333,750.00	26.00	650,000.00
4	Cement, mixed in concrete, except the concrete specified in Items 5, 6 and 7	42,000 bbls.	2.50	105,000.00	2.63	110,460.00	2.10	88,200.00	3.36	141,120.00	4.65	195,300.00	2.50	105,000.00	2.60	109,200.00	2.15	90,300.00	3.60	151,200.00	3.10	130,200.00	2.50	105,000.00
5	Precast concrete forms	70,000 sq. ft.	.35	24,500.00	.39	27,300.00	.30	21,000.00	.20	14,000.00	.25	17,500.00	.40	28,000.00	.40	28,000.00	.45	31,500.00	.25	17,500.00	.60	42,000.00	.75	52,500.00
6	39 in. Precast concrete pipe sewer	1,300 lin. ft.	11.00	14,300.00	10.00	13,000.00	10.00	13,000.00	8.00	10,400.00	24.00	31,200.00	10.00	13,000.00	9.00	11,700.00	10.00	13,000.00	17.25	22,425.00	19.40	25,220.00	20.00	26,000.00
7	3 ft. 6 in. by 2 ft. 4 in. concrete sewer	1,000 lin. ft.	15.00	15,000.00	20.00	20,000.00	12.00	12,000.00	18.00	18,000.00	21.00	21,000.00	19.05	19,050.00	25.00	25,000.00	18.25	18,250.00	16.10	16,100.00	23.80	23,800.00	33.00	33,000.00
8	24 in. vitrified pipe sewer	2,100 lin. ft.	13.00	27,300.00	4.95	10,395.00	8.00	16,800.00	13.44	28,224.00	15.00	31,500.00	5.00	10,500.00	7.00	14,700.00	10.00	21,000.00	15.00	31,500.00	14.20	29,820.00	13.00	27,300.00
9	Cast iron pipe	300,000 lbs.	.06	18,000.00	.046	13,800.00	.04	12,000.00	.05	15,000.00	.11	33,000.00	.05	15,000.00	.08	24,000.00	.05	15,000.00	.0825	24,750.00	.045	13,500.00	.18	54,000.00
10	Reinforcing rods, except in concrete specified in Items 5, 6, 7 and 28	400,000 lbs.	.05	20,000.00	.0435	17,400.00	.04	16,000.00	.06	24,000.00	.05	20,000.00	.05	20,000.00	.07	28,000.00	.065	26,000.00	.0525	21,000.00	.055	22,000.00	.055	22,000.00
11	Reinforcing mesh, except in concrete specified in Items 5, 6, 7 and 28	120,000 lbs.	.15	18,000.00	.062	7,440.00	.30	36,000.00	.25	30,000.00	.10	12,000.00	.15	18,000.00	.20	24,000.00	.10	12,000.00	.165	19,800.00	.20	24,000.00	.14	16,800.00
12	Bronze	300 lbs.	2.00	600.00	1.00	300.00	1.00	300.00	.42	126.00	.55	165.00	.50	150.00	1.00	300.00	1.00	300.00	1.50	450.00	.50	150.00	1.20	360.00
13	Iron and steel castings, except those specified in Items 9 and 14	50,000 lbs.	.13	6,500.00	.125	6,250.00	.10	5,000.00	.12	6,000.00	.11	5,500.00	.10	5,000.00	.12	6,000.00	.06	3,000.00	.31	15,500.00	.08	4,000.00	.13	6,500.00
14	Galvanized iron boxes and covers	17,000 lbs.	.35	5,950.00	.10	1,700.00	.60	10,200.00	.24	4,080.00	.40	6,800.00	.50	8,500.00	.50	8,500.00	.30	5,100.00	.30	5,100.00	.30	5,100.00	.43	7,310.00
15	1 in. galvanized steel conduits	8,700 lin. ft.	.35	3,045.00	.44	3,828.00	.25	2,175.00	.42	3,654.00	.30	2,610.00	.35	3,045.00	.70	6,090.00	.40	3,480.00	.30	2,610.00	.70	6,090.00	.55	4,785.00
16	1½ in. galvanized steel conduits	100 lin. ft.	.50	50.00	.62	62.00	.35	35.00	.56	56.00	.40	40.00	.50	50.00	1.25	125.00	.65	65.00	.52	52.00	1.20	120.00	1.00	100.00
17	2 in. galvanized steel conduits	1,700 lin. ft.	.75	1,275.00	.81	1,377.00	.40	680.00	.84	1,428.00	.50	850.00	.55	935.00	1.75	2,975.00	.75	1,275.00	.60	1,020.00	1.30	2,210.00	1.40	2,380.00
18	2½ in. galvanized steel conduits	4,500 lin. ft.	.80	3,600.00	1.00	4,500.00	.55	2,475.00	1.12	5,040.00	.70	3,150.00	.70	3,150.00	2.00	9,000.00	.85	3,825.00	.80	3,600.00	1.90	8,550.00	2.00	9,000.00
19	3 in. galvanized steel conduits	1,200 lin. ft.	1.50	1,800.00	1.40	1,680.00	.70	840.00	1.40	1,680.00	1.00	1,200.00	1.00	1,200.00	3.00	3,600.00	1.00	1,200.00	1.10	1,320.00	2.70	3,240.00	2.40	2,880.00
20	4 in. galvanized steel conduits	300 lin. ft.	2.00	600.00	2.00	600.00	.90	270.00	1.68	504.00	1.30	390.00	2.00	600.00	6.00	1,800.00	1.25	375.00	1.60	480.00	3.80	1,140.00	3.00	900.00
21	4 in. fibre conduits	12,600 lin. ft.	.50	6,300.00	.37	4,662.00	.50	6,300.00	.56	7,056.00	.75	9,450.00	.40	5,040.00	.30	3,780.00	.30	3,780.00	.45	5,670.00	.65	8,190.00	.25	3,150.00
22	Three ply membrane waterproofing	17,000 sq. yds.	2.00	34,000.00	1.83	31,110.00	1.20	20,400.00	2.00	34,000.00	1.75	29,750.00	1.75	29,750.00	1.80	30,600.00	3.00	51,000.00	2.00	34,000.00	2.75	46,750.00	2.00	34,000.00
23	Asbestos lumber	800 sq. ft.	.50	400.00	1.00	800.00	.60	480.00	.56	448.00	.175	140.00	2.25	1,800.00	1.00	800.00	1.00	800.00	1.50	1,200.00	1.60	1,280.00	1.00	800.00
24	Sheeting left in place	12,500 sq. ft.	.01	125.00	.19	2,375.00	.15	1,875.00	.07	875.00	.10	1,250.00	.05	625.00	.10	1,250.00	.01	125.00	.12	1,500.00	.65	8,125.00	.01	125.00
25	Granite curbing	6,500 lin. ft.	4.00	26,000.00	4.70	30,550.00	3.30	21,450.00	5.60	36,400.00	3.35	21,775.00	3.25	21,125.00	5.00	32,500.00	3.25	21,125.00	4.90	31,850.00	3.80	24,700.00	5.50	35,750.00
26	New bluestone curbing	1,800 lin. ft.	3.50	6,300.00	3.10	5,580.00	2.25	4,050.00	2.10	3,780.00	2.50	4,500.00	2.00	3,600.00	3.50	6,300.00	2.00	3,600.00	3.90	7,020.00	2.50	4,500.00	2.00	3,600.00
27	Salvaged bluestone curbing	2,000 lin. ft.	2.00	4,000.00	1.90	3,800.00	1.50	3,000.00	.84	1,680.00	1.10	2,200.00	1.00	2,000.00	2.00	4,000.00	1.00	2,000.00	1.50	3,000.00	1.20	2,400.00	1.00	2,000.00
28	Sheet asphalt pavement with concrete base	17,000 sq. yds.	2.00	34,000.00	4.06	69,020.00	3.00	51,000.00	3.80	64,600.00	5.50	93,500.00	3.75	63,750.00	5.00	85,000.00	5.00	85,000.00	3.75	63,750.00	4.20	71,400.00	5.00	85,000.00
29	Concrete sidewalks	3,000 sq. yds.	3.50	10,500.00	3.10	9,300.00	2.70	8,100.00	3.22	9,660.00	4.50	13,500.00	2.50	7,500.00	3.60	10,800.00	2.50	7,500.00	4.70	14,100.00	3.20	9,600.00	3.00	9,000.00
	Total estimated contract price			1,756,945.00		1,768,709.00		1,960,630.00		2,143,061.00		2,192,865.00		2,279,470.00		2,362,520.00		2,740,450.00		2,894,547.00		2,956,835.00		2,965,000.00

TABULATION OF BIDS FOR RIVERSIDE DRIVE CONNECTIONS—NEW YORK APPROACH

CONTRACT HRB-9

Received September 15, 1930

Item	Description	Quantities for Comparison	Wm P McGarry		Leonard Paving Co., Inc.		Geo Colon Const. Co.		La Rocco Const. Co.		Cornell Cont. Corp.		Cianciulli Corp.		P. T. Cox Cont. Co.		W. H. Gahagan Co.		Arthur McMullen Co.		J. F. Murphy Cont. Co.		Poirer & McLane Co.		Triest Cont. Co.	
			Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Excavation, except that involved in Item 39	70,000 cu. yds	$ 2.37	$165,900.00	$ 1.50	$105,000.00	$ 3.31	$231,700.00	$ 3.27	$228,900.00	$ 2.00	$140,000.00	$ 2.60	$182,000.00	$ 3.07	$214,900.00	$ 2.80	$ 196,000.00	$ 5.30	$371,000.00	$ 4.00	$280,000.00	$ 4.50	$315,000.00	$ 2.89	$202,300.00
2	Fill west of Riverside Drive except that involved in Item 39	39,000 cu yds.	.30	11,700.00	1.00	39,000.00	.10	3,900.00	.55	21,450.00	.40	15,600.00	.00	.00	.36	14,040.00	.25	9,750.00	.50	19,500.00	.10	3,900.00	.75	29,250.00	.55	21,450.00
3	Concrete, except that specified or involved in Items 11, 14, 22, 23, 39	14,600 cu yds	12.20	178,120.00	15.25	222,650.00	15.10	220,460.00	11.10	162,060.00	19.75	288,350.00	21.00	306,600.00	20.47	298,862.00	21.00	306,600.00	13.50	197,100.00	24.00	350,400.00	19.00	277,400.00	22.55	329,230.00
4	Cement mixed in concrete except the concrete specified in Item 22	28,000 bbls	2.15	60,200.00	2.65	74,200.00	2.40	67,200.00	3.85	107,800.00	2.50	70,000.00	2.25	63,000.00	2.85	79,800.00	3.78	105,840.00	3.00	84,000.00	2.50	70,000.00	2.70	75,600.00	3.61	101,080.00
5	Granite, except that specified in Items 8, 12	1,300 cu. yds	157.85	205,205.00	149.00	193,700.00	145.00	188,500.00	187.50	243,750.00	180.00	234,000.00	160.00	208,000.00	158.70	206,310.00	200.00	260,000.00	160.00	208,000.00	200.00	260,000.00	185.00	240,500.00	241.75	314,275.00
6	Rubble, masonry walls	1,000 cu. yds	10.89	10,890.00	12.10	12,100.00	8.10	8,100.00	11.00	11,000.00	12.00	12,000.00	9.00	9,000.00	10.35	10,350.00	26.00	26,000.00	14.00	14,000.00	12.00	12,000.00	15.00	15,000.00	22.76	22,760.00
7	Rubble, masonry facing	1,950 cu. yds	15.96	31,122.00	17.50	34,125.00	16.00	31,200.00	15.50	30,225.00	36.00	70,200.00	20.00	39,000.00	17.25	33,637.50	28.00	54,600.00	27.00	52,650.00	27.00	52,650.00	27.00	52,650.00	27.20	53,040.00
8	Granite block pavement	9,900 sq yds	6.23	61,677.00	6.65	65,835.00	6.50	64,350.00	6.00	59,400.00	6.00	59,400.00	5.50	54,450.00	6.32	62,568.00	6.00	59,400.00	6.25	61,875.00	5.85	57,915.00	6.00	59,400.00	8.20	81,180.00
9	Sheet asphalt pavement	8,300 sq yds	1.84	15,272.00	1.35	11,205.00	1.50	12,450.00	1.40	11,620.00	1.70	14,110.00	2.00	16,600.00	1.47	12,201.00	1.28	10,624.00	1.75	14,525.00	1.40	11,620.00	1.45	12,035.00	2.22	18,426.00
10	Asphalt block pavement	7,100 sq yds	3.23	22,933.00	4.15	29,465.00	3.00	21,300.00	3.50	24,850.00	3.50	24,850.00	3.00	21,300.00	3.51	24,921.00	3.10	22,010.00	3.50	24,850.00	3.25	23,075.00	3.50	24,850.00	4.81	34,151.00
11	Concrete pavement, base on subgrade	23,000 sq yds	1.50	34,500.00	2.25	51,750.00	1.50	34,500.00	1.25	28,750.00	1.20	27,600.00	2.10	48,300.00	1.84	42,320.00	1.50	34,500.00	2.50	57,500.00	1.35	31,050.00	2.00	46,000.00	2.14	49,220.00
12	5" Granite curbing	12,000 lin ft	2.13	25,560.00	3.30	39,600.00	2.80	33,600.00	3.10	37,200.00	3.70	44,400.00	2.75	33,000.00	2.99	35,880.00	3.00	36,000.00	4.00	48,000.00	2.50	30,000.00	3.25	39,000.00	3.51	42,120.00
13	Resetting salvaged bluestone curbing	140 lin ft	2.20	308.00	2.00	280.00	1.50	210.00	1.25	175.00	2.00	280.00	1.00	140.00	1.72	240.80	1.50	210.00	3.00	420.00	1.50	210.00	2.00	280.00	1.80	252.00
14	Concrete sidewalks on subgrade	2,500 sq yds	2.50	6,250.00	5.15	12,875.00	2.20	5,500.00	2.50	6,250.00	1.80	4,500.00	2.50	6,250.00	2.87	7,175.00	1.90	4,750.00	3.50	8,750.00	1.80	4,500.00	3.50	8,750.00	1.76	4,400.00
15	Reinforcing rods	1,600,000 lbs	.045	72,000.00	.065	104,000.00	.049	78,400.00	.05	80,000.00	.04	64,000.00	.05	80,000.00	.06	96,000.00	.06	96,000.00	.05	80,000.00	.04	64,000.00	.045	72,000.00	.061	97,600.00
16	Wrought iron drainage pipe	10,000 lbs	.11	1,100.00	.15	1,500.00	.08	800.00	.30	3,000.00	.12	1,200.00	.05	500.00	.23	2,300.00	.23	2,300.00	.35	3,500.00	.20	2,000.00	.30	3,000.00	.17	1,700.00
17	4" Cast iron pipe	2,000 lin ft	2.59	5,180.00	.60	1,200.00	1.00	2,000.00	1.25	2,500.00	1.50	3,000.00	1.00	2,000.00	1.15	2,300.00	.57	1,140.00	1.25	2,500.00	1.50	3,000.00	3.00	6,000.00	1.12	2,240.00
18	Relaying 12" cast iron pipe except that involved in Item 38	600 lin. ft	2.20	1,320.00	.50	300.00	.60	360.00	1.85	1,110.00	1.50	900.00	3.00	1,800.00	5.75	3,450.00	2.00	1,200.00	3.50	2,100.00	3.00	1,800.00	3.00	1,800.00	2.98	1,788.00
19	8" Vitrified clay pipe	300 lin ft	1.32	396.00	1.50	450.00	1.00	300.00	.95	285.00	.60	180.00	1.00	300.00	1.03	309.00	.38	114.00	2.50	750.00	1.00	300.00	2.00	600.00	.76	228.00
20	12" Vitrified clay pipe	130 lin ft	2.40	312.00	1.50	195.00	1.30	169.00	1.80	234.00	1.00	130.00	2.00	260.00	1.73	224.90	.84	109.20	3.00	390.00	2.00	260.00	4.00	520.00	1.30	169.00
21	18" Vitrified clay pipe	670 lin ft	4.00	2,680.00	2.00	1,340.00	2.50	1,675.00	4.50	3,015.00	2.80	1,876.00	2.50	1,675.00	4.25	2,847.50	1.40	938.00	4.00	2,680.00	3.50	2,345.00	5.00	3,350.00	2.70	1,809.00
22	42" Precast concrete pipe	1,100 lin ft	10.35	11,385.00	5.50	6,050.00	10.00	11,000.00	11.15	12,265.00	8.50	9,350.00	9.00	9,900.00	12.65	13,915.00	8.90	9,790.00	8.50	9,350.00	10.00	11,000.00	14.00	15,400.00	10.69	11,759.00
23	3'6" by 2'4" concrete sewer	840 lin ft	17.10	14,364.00	12.00	10,080.00	15.00	12,600.00	9.35	7,854.00	14.00	11,760.00	12.00	10,080.00	25.30	21,252.00	13.50	11,340.00	20.00	16,800.00	20.00	16,800.00	25.00	21,000.00	15.40	12,936.00
24	3" Steel conduits	1,300 lin ft	1.51	1,963.00	1.00	1,300.00	1.50	1,950.00	1.25	1,625.00	1.30	1,690.00	1.25	1,625.00	1.61	2,093.00	1.90	2,470.00	1.65	2,145.00	1.50	1,950.00	2.00	2,600.00	.92	1,196.00
25	2" Steel conduits	2,400 lin ft	.77	1,848.00	.75	1,800.00	.90	2,160.00	.75	1,800.00	1.00	2,400.00	1.15	2,760.00	1.04	2,496.00	1.40	3,360.00	1.10	2,640.00	1.25	3,000.00	1.70	4,080.00	.49	1,176.00
26	1½" Steel conduits	2,000 lin. ft	.61	1,220.00	.50	1,000.00	.70	1,400.00	.60	1,200.00	.60	1,200.00	1.00	2,000.00	.80	1,600.00	.75	1,500.00	.90	1,800.00	1.15	2,300.00	1.50	3,000.00	.41	820.00
27	Iron & steel castings except those specified or involved in Items 17, 18, 28, 30 to 38	70,000 lbs.	.11	7,700.00	.10	7,000.00	.10	7,000.00	.125	8,750.00	.12	8,400.00	.08	5,600.00	.07	4,900.00	.05	3,500.00	.08	5,600.00	.15	10,500.00	.08	5,600.00	.137	9,590.00
28	Metal railing	950 lin ft	12.10	11,495.00	3.00	2,850.00	12.50	11,875.00	15.00	14,250.00	13.00	12,350.00	8.00	7,600.00	15.52	14,744.00	14.00	13,300.00	13.75	13,062.50	12.00	11,400.00	11.00	10,450.00	22.40	21,280.00
29	1½" Pipe handrailing	820 lin ft	1.20	984.00	.50	410.00	1.25	1,025.00	2.00	1,640.00	1.40	1,148.00	4.50	3,690.00	1.32	1,082.40	1.90	1,558.00	1.80	1,476.00	1.75	1,435.00	2.00	1,640.00	2.90	2,378.00
30	Electric light standards, Type A	13	117.00	1,521.00	125.00	1,625.00	105.00	1,365.00	120.00	1,560.00	115.00	1,495.00	115.00	1,495.00	116.00	1,508.00	145.00	1,885.00	120.00	1,560.00	100.00	1,300.00	100.00	1,300.00	215.00	2,795.00
31	Electric light standards, Type B	8	131.00	1,048.00	135.00	1,080.00	119.00	952.00	120.00	960.00	130.00	1,040.00	125.00	1,000.00	131.00	1,048.00	160.00	1,280.00	135.00	1,080.00	110.00	880.00	110.00	880.00	244.00	1,952.00
32	Electric light standards, Type C	22	123.00	2,706.00	125.00	2,750.00	112.00	2,464.00	120.00	2,640.00	125.00	2,750.00	115.00	2,530.00	123.00	2,706.00	160.00	3,520.00	120.00	2,640.00	100.00	2,200.00	110.00	2,420.00	244.00	5,368.00
33	Electric light standards, Type D	7	135.00	945.00	135.00	945.00	123.00	861.00	120.00	840.00	140.00	980.00	125.00	875.00	136.00	952.00	175.00	1,225.00	140.00	980.00	110.00	770.00	120.00	840.00	268.00	1,876.00
34	Electric light standards, Type E	17	85.00	1,445.00	90.00	1,530.00	75.00	1,275.00	100.00	1,700.00	80.00	1,360.00	80.00	1,360.00	84.00	1,428.00	100.00	1,700.00	80.00	1,360.00	70.00	1,190.00	75.00	1,275.00	152.00	2,584.00
35	Electric light standards, Type K	36	57.00	2,052.00	105.00	3,780.00	48.00	1,728.00	80.00	2,880.00	50.00	1,800.00	95.00	3,420.00	54.00	1,944.00	75.00	2,700.00	75.00	2,700.00	75.00	2,700.00	50.00	1,800.00	114.00	4,104.00
36	Electric light standards, Type L	10	77.00	770.00	115.00	1,150.00	68.00	680.00	90.00	900.00	70.00	700.00	105.00	1,050.00	75.00	750.00	40.00	400.00	90.00	900.00	85.00	850.00	70.00	700.00	99.30	993.00
37	Galvanized cast iron boxes and steel covers	300 lbs	.15	45.00	.12	36.00	.20	60.00	.45	135.00	.50	150.00	.15	45.00	1.03	309.00	1.65	495.00	.70	210.00	.30	90.00	.25	75.00	1.62	486.00
38	Construction and reconstruction of water mains except excavation and concrete construction			4,000.00		10,000.00		7,500.00		9,000.00		5,000.00		7,500.00		5,000.00		6,000.00		10,000.00		15,000.00		30,000.00		17,086.00
39	Construction of six tennis courts			17,853.00		8,500.00		9,500.00		5,000.00		10,000.00		4,000.00		5,500.00		2,000.00		12,000.00		16,000.00		9,000.00		19,950.00
	Total estimated contract price			995,969.00		1,062,656.00		1,082,069.00		1,138,573.00		1,144,149.00		1,146,705.00		1,233,864.10		1,296,108.20		1,340,393.50		1,360,390.00		1,395,045.00		1,497,747.00

TABULATION OF BIDS FOR NEW JERSEY APPROACH EXCAVATION AND MISCELLANEOUS CONSTRUCTION AT HUDSON TERRACE

CONTRACT HRB-10

Received June 2, 1930

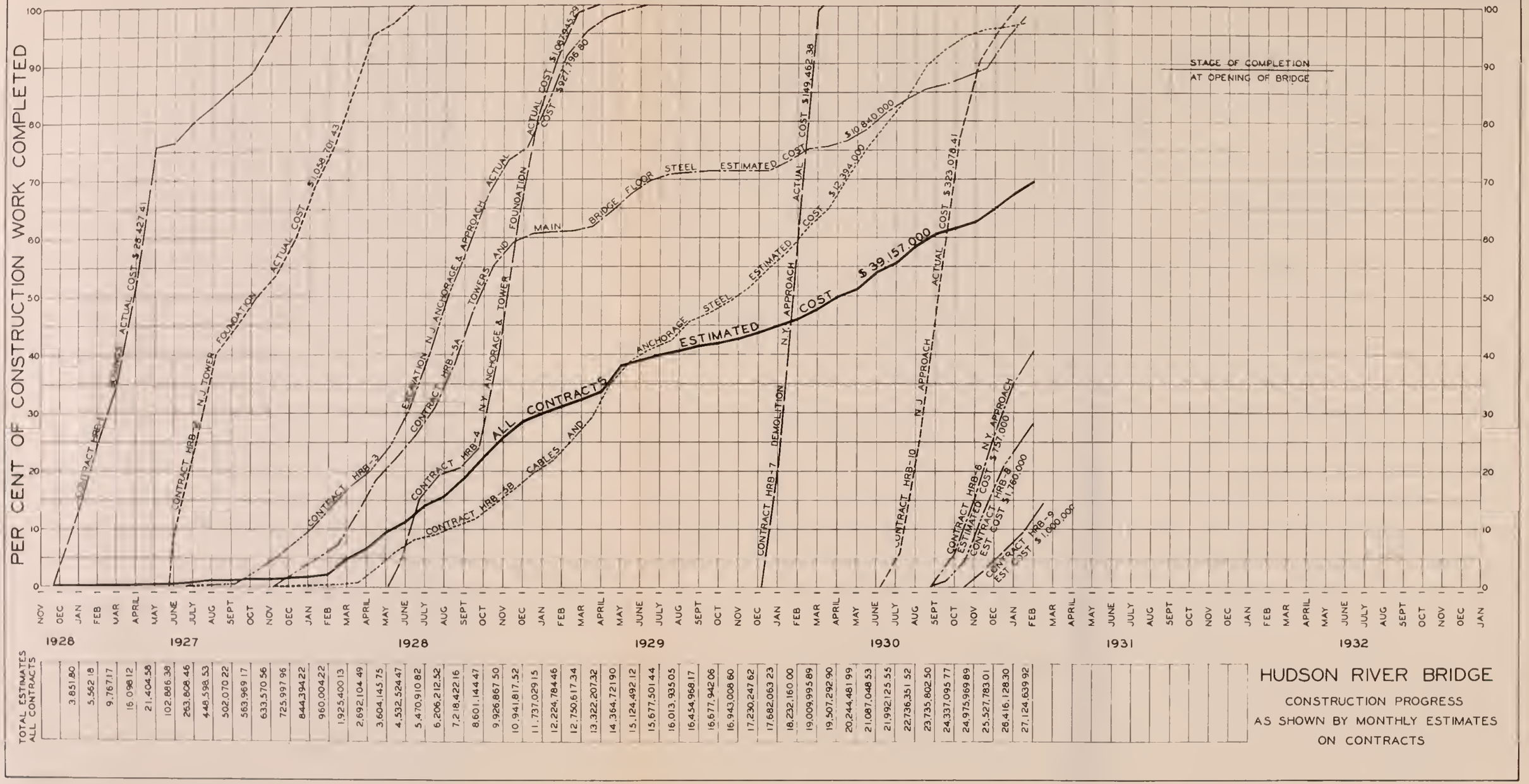
Item	Classification	Quantities for Comparison	Corbisello Brothers, Inc.		George M. Brewster & Son, Inc.		Anthony Cianciulli Corporation		Coppoletta Bros., Inc.		S. J. Groves & Sons Co.		W. H. Gahagan, Inc.		Parker & Graham, Inc.		Cornell Contracting Corporation		Clemente Engineering Corporation		Wilson & English Construction Co., Inc.		J. F. Murphy Contracting Co., Inc.		Joseph L. Sigretto & Sons, Inc.		P. S. Kramer	
			Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Excavation	74,000 cu. yds.	$ 2.13	$157,620.00	$ 2.86	$211,640.00	$ 2.75	$203,500.00	$ 3.25	$240,500.00	$ 3.50	$259,000.00	$ 3.65	$270,100.00	$ 3.50	$259,000.00	$ 4.80	$355,200.00	$ 4.50	$333,000.00	$ 5.00	$370,000.00	$ 5.00	$370,000.00	$ 6.00	$444,000.00	$ 5.95	$440,300.00
2	Concrete, except that specified in Items 4 and 9	2,000 cu. yds.	16.50	33,000.00	11.00	22,000.00	11.00	22,000.00	12.00	24,000.00	14.00	28,000.00	12.66	25,320.00	16.00	32,000.00	12.00	24,000.00	11.50	23,000.00	11.50	23,000.00	13.50	27,000.00	11.00	22,000.00	18.50	37,000.00
3	Granite, in place, except that specified in Item 8	280 cu. yds.	146.30	40,964.00	100.00	28,000.00	130.00	36,400.00	105.00	29,400.00	100.00	28,000.00	102.00	28,560.00	130.00	36,400.00	100.00	28,000.00	135.00	37,800.00	85.00	23,800.00	150.00	42,000.00	100.00	28,000.00	60.00	16,800.00
4	Paving	1,600 sq. yds.	4.40	7,040.00	2.00	3,200.00	2.50	4,000.00	4.00	6,400.00	3.25	5,200.00	2.85	4,560.00	2.00	3,200.00	3.00	4,800.00	3.25	5,200.00	2.00	3,200.00	3.30	5,280.00	3.00	4,800.00	3.50	5,600.00
5	Cement, mixed in concrete	3,500 bbls.	3.30	11,550.00	3.00	10,500.00	2.85	9,975.00	2.50	8,750.00	2.50	8,750.00	2.35	8,225.00	3.00	10,500.00	2.50	8,750.00	3.50	12,250.00	2.75	9,625.00	3.30	11,550.00	3.00	10,500.00	2.75	9,625.00
6	Reinforcing steel, in place	180,000 lbs.	.09	16,200.00	.04	7,200.00	.055	9,900.00	.04	7,200.00	.05	9,000.00	.05	9,000.00	.06	10,800.00	.05	9,000.00	.10	18,000.00	.05	9,000.00	.05	9,000.00	.05	9,000.00	.07	12,600.00
7	Cast iron, in place	7,000 lbs.	.11	770.00	.03	210.00	.08	560.00	.035	245.00	.10	700.00	.07	490.00	.05	350.00	.10	700.00	.10	700.00	.06	420.00	.10	700.00	.09	630.00	.05	350.00
8	Granite curb, in place	270 lin. ft.	5.50	1,485.00	4.55	1,228.50	4.50	1,215.00	2.50	675.00	2.50	675.00	2.50	675.00	4.25	1,147.50	4.00	1,080.00	5.00	1,350.00	5.00	1,350.00	5.00	1,350.00	1.25	337.50	2.70	729.00
9	30" reinforced concrete pipe, in place	340 lin. ft.	7.70	2,618.00	5.50	1,870.00	6.50	2,210.00	5.20	1,768.00	5.00	1,700.00	4.00	1,360.00	4.50	1,530.00	6.00	2,040.00	10.00	3,400.00	7.00	2,380.00	8.00	2,720.00	5.50	1,870.00	8.65	2,941.00
10	18" vitrified clay pipe, in place	380 lin. ft.	5.06	1,922.80	2.10	798.00	3.50	1,330.00	5.05	1,919.00	2.50	950.00	1.40	532.00	2.50	950.00	3.00	1,140.00	4.00	1,520.00	5.00	1,900.00	4.00	1,520.00	2.00	760.00	4.50	1,710.00
11	12" vitrified clay pipe, in place	850 lin. ft.	4.40	3,740.00	1.05	892.50	1.00	850.00	2.00	1,700.00	2.50	2,125.00	.80	680.00	1.25	1,062.50	2.00	1,700.00	4.00	3,400.00	4.00	3,400.00	2.50	2,125.00	.90	765.00	16.00	13,600.00
12	6" vitrified clay pipe, in place	150 lin. ft.	3.30	495.00	.75	112.50	.60	90.00	1.00	150.00	2.00	300.00	.54	81.00	1.00	150.00	1.00	150.00	1.90	285.00	2.50	375.00	2.00	300.00	.40	60.00	16.00	2,400.00
	Total			277,404.80		287,651.50		292,030.00		322,707.00		344,400.00		349,583.00		357,090.00		436,560.00		439,905.00		448,450.00		473,545.00		522,722.50		543,655.00

TABULATION OF BIDS FOR PAVING AND MISCELLANEOUS CONSTRUCTION—NEW JERSEY APPROACH

CONTRACT HRB-11

Received January 5, 1931

Item	Description	Quantities for Comparison	Geo. M. Brewster & Son, Inc. Unit Price	Geo. M. Brewster & Son, Inc. Amount	International Engr. Co., Inc. Unit Price	International Engr. Co., Inc. Amount
1	Excavation	5,500 cu. yds.	$ 3.20	$ 17,600.00	$ 7.00	$ 38,500.00
2	Fill for sub-grade	7,000 cu. yds.	.78	5,460.00	1.00	7,000.00
3.	Hand-placed rock fill	900 cu. yds.	8.15	7,335.00	1.00	900.00
4	Drilling holes in rock at anchorage pits	3,700 lin. ft.	1.00	3,700.00	.50	1,850.00
5	Concrete, except that specified in Items 10, 11, 12 and 13	5,000 cu. yds.	17.55	87,750.00	16.00	80,000.00
6	Cement, except that involved in Item 16	22,000 bbls.	2.85	62,700.00	2.50	55,000.00
7	Rubble masonry	2,000 cu. yds.	11.50	23,000.00	10.00	20,000.00
8	Granite masonry	100 cu. yds.	152.35	15,235.00	170.00	17,000.00
9	Granite curbing	8,200 lin. ft.	3.43	28,126.00	2.25	18,450.00
10	Concrete curbing	1,950 lin. ft.	.63	1,228.50	1.00	1,950.00
11	Concrete sidewalks on sub-grade	3,500 sq. yds.	1.15	4,025.00	2.50	8,750.00
12	Concrete roadway pavement on sub-grade	27,600 sq. yds.	1.95	53,820.00	2.00	55,200.00
13	Concrete base for granite block pavement	2,700 sq. yds.	1.15	3,105.00	2.00	5,400.00
14	Granite block pavement, with sand-cement cushion	2,700 sq. yds.	5.90	15,930.00	6.50	17,550.00
15	Penetration macadam pavement	1,200 sq. yds.	1.30	1,560.00	2.00	2,400.00
16	Hollow tile walls with gunite coating	2,500 sq. ft.	.83	2,075.00	1.25	3,125.00
17	Structural Steel	750,000 lbs.	.049	36,750.00	.045	33,750.00
18	Reinforcing rods	1,000,000 lbs.	.0437	43,700.00	.05	50,000.00
19	Wrought iron pipe	46,000 lbs.	.19	8,740.00	.12	5,520.00
20	Metal railing	1,950 lin. ft.	8.24	16,068.00	7.50	14,625.00
21	Castings for manhole covers and frames, inlet gratings and frames, and fittings for wrought iron pipe	85,000 lbs.	.05	4,250.00	.12	10,200.00
22	Cast iron pipe	26,000 lbs.	.04	1,040.00	.10	2,600.00
23	Four (4) inch diam. vitrified clay pipe	500 lin. ft.	.20	100.00	1.00	500.00
24	Eight (8) inch diam. vitrified clay pipe	4,500 lin. ft.	.75	3,375.00	1.00	4,500.00
25	Eighteen (18) inch diam. vitrified clay pipe	2,600 lin. ft.	1.40	3,640.00	2.00	5,200.00
26	Twenty (20) inch diam. vitrified clay pipe	670 lin. ft.	1.65	1,105.50	2.00	1,340.00
27	Twenty-four (24) inch diam. vitrified clay pipe	1,360 lin. ft.	2.30	3,128.00	3.00	4,080.00
28	Four (4) inch fibre conduits	11,900 lin. ft.	.28	3,332.00	.50	5,950.00
29	One (1) inch steel conduits	1,300 lin. ft.	.26	338.00	.40	520.00
30	One and one-half (1½) inch steel conduits	550 lin. ft.	.33	181.50	.60	330.00
31	Two (2) inch steel conduits	11,300 lin. ft.	.40	4,520.00	.80	9,040.00
32	Two and one-half (2½) inch steel conduits	2,050 lin. ft.	.55	1,127.50	1.00	2,050.00
33	Three (3) inch steel conduits	2,750 lin. ft.	.68	1,870.00	1.50	4,125.00
34	Cast iron frames and steel covers for electrical boxes	2,700 lbs.	.11	297.00	.10	270.00
35	Galvanized cast iron electrical boxes and cover	500 lbs.	.15	75.00	.50	250.00
36	Demolition and removal of Duff Flats and filling cellar thereof	....		3,180.00		2,000.00
	Total estimated contract price			469,467.00		489,925.00


PER CENT OF CONSTRUCTION WORK COMPLETED
STAGE OF COMPLETION AT OPENING OF BRIDGE
CONTRACT HRB-1 ACTUAL COST $ 28,427.41
CONTRACT HRB-2 N.J. TOWER FOUNDATION ACTUAL COST $1,058,701.43
CONTRACT HRB-3 EXCAVATION N.J. ANCHORAGE & APPROACH ACTUAL COST $1,041,845.29
CONTRACT HRB-3A TOWERS AND FOUNDATION ACTUAL COST $927,196.80
CONTRACT HRB-4 N.Y. ANCHORAGE & TOWER
ALL CONTRACTS
CONTRACT HRB-5B CABLES AND
MAIN BRIDGE FLOOR STEEL ESTIMATED COST $10,840,000
ACTUAL COST $11,149,462.38
ANCHORAGE STEEL ESTIMATED COST $12,394,000
ACTUAL COST $13,323,078.41
ESTIMATED COST $ 39,157,000
CONTRACT HRB-7 DEMOLITION N.Y. APPROACH
CONTRACT HRB-10 N.J. APPROACH
CONTRACT HRB-6 N.Y. APPROACH ESTIMATED COST $737,000
CONTRACT HRB-8 EST COST $1,160,000
CONTRACT HRB-9 EST COST $1,000,000
NOV DEC JAN FEB MAR APRIL MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB MAR APRIL MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB MAR APRIL MAY JUNE JULY AUG SEPT OCT NOV DEC JAN
1928 1927 1928 1929 1930 1931 1932

TOTAL ESTIMATES ALL CONTRACTS

	3,851.80
	5,562.18
	9,767.17
	16,098.12
	21,404.58
	102,886.38
	263,808.46
	448,598.53
	502,070.22
	563,969.17
	633,570.56
	725,997.96
	844,394.22
	960,004.22
	1,925,400.13
	2,692,104.49
	3,604,143.75
	4,532,524.47
	5,470,910.82
	6,206,212.52
	7,218,422.16
	8,601,144.47
	9,926,867.50
	10,941,817.52
	11,737,029.15
	12,224,784.46
	12,750,617.34
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	14,364,721.90
	15,124,492.12
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	16,013,935.05
	16,454,968.17
	16,677,942.06
	16,943,008.60
	17,230,247.62
	17,682,063.23
	18,232,160.00
	19,009,995.89
	19,507,292.90
	20,244,481.99
	21,087,048.53
	21,992,125.55
	22,736,351.52
	23,735,802.50
	24,337,095.77
	24,975,969.89
	25,527,783.01
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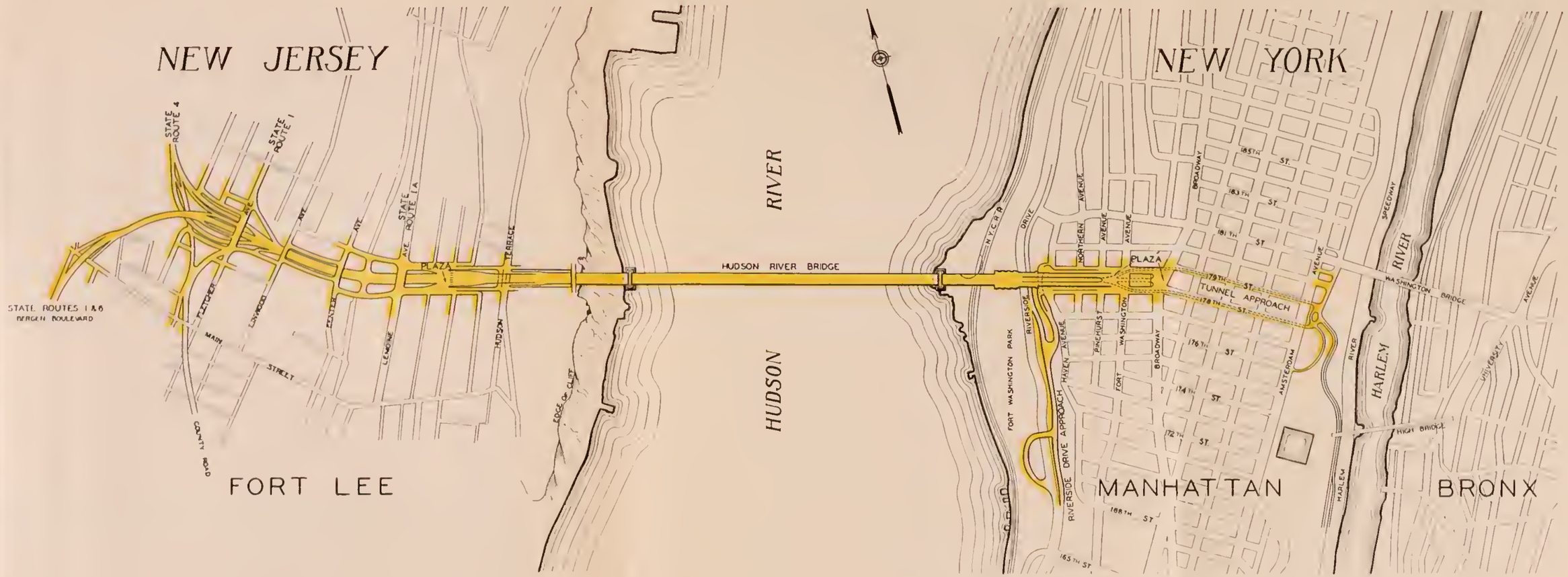
	27,124,639.92

HUDSON RIVER BRIDGE

CONSTRUCTION PROGRESS
AS SHOWN BY MONTHLY ESTIMATES
ON CONTRACTS



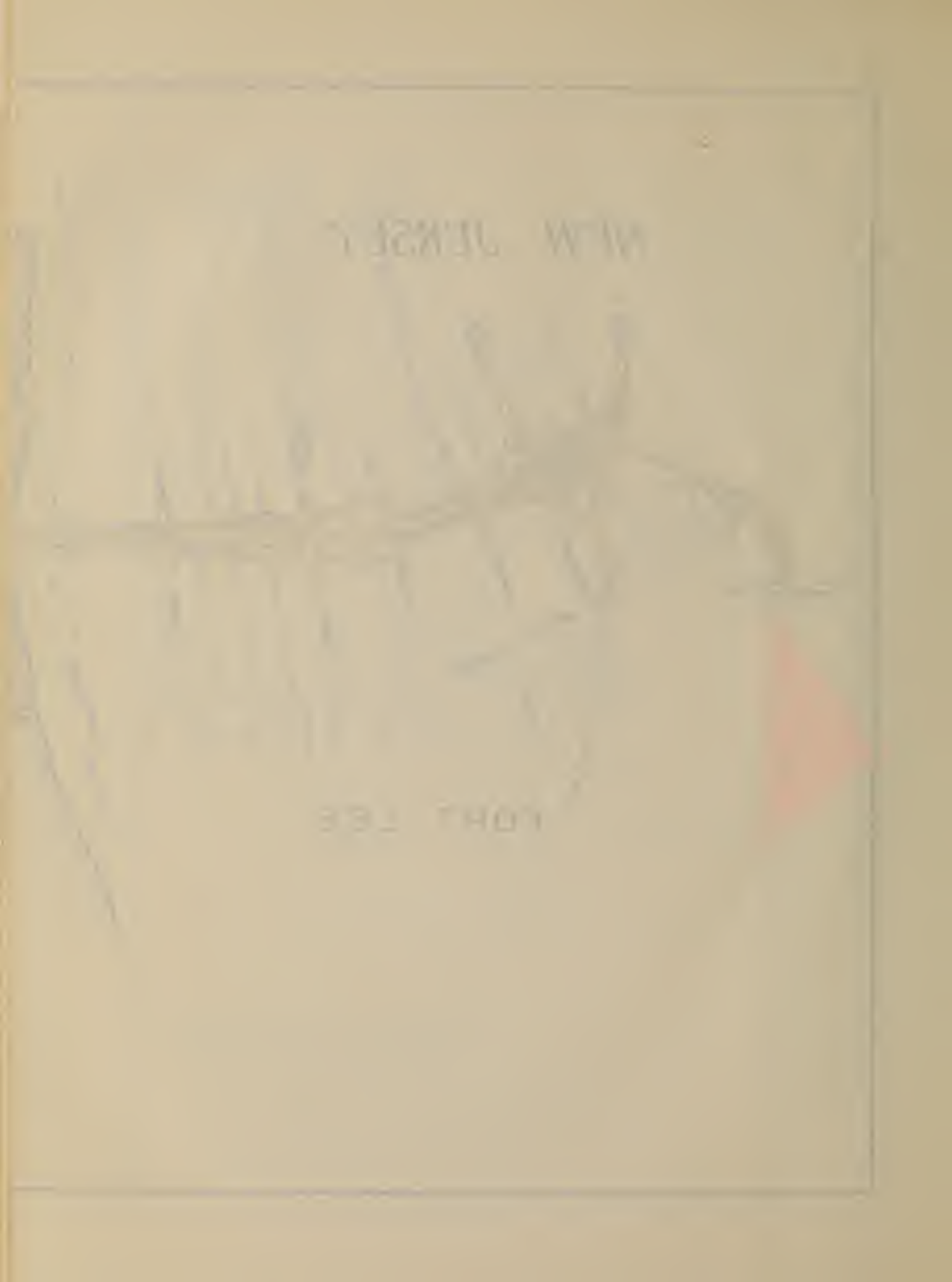
THE PORT OF NEW YORK AUTHORITY

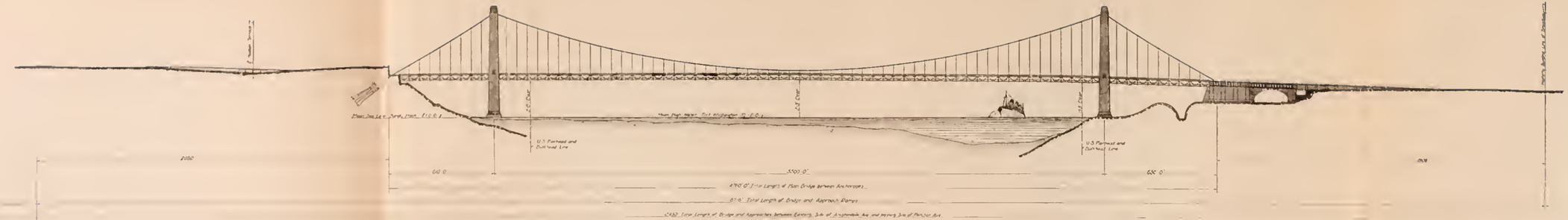
HUDSON RIVER BRIDGE

FORT WASHINGTON - FORT LEE

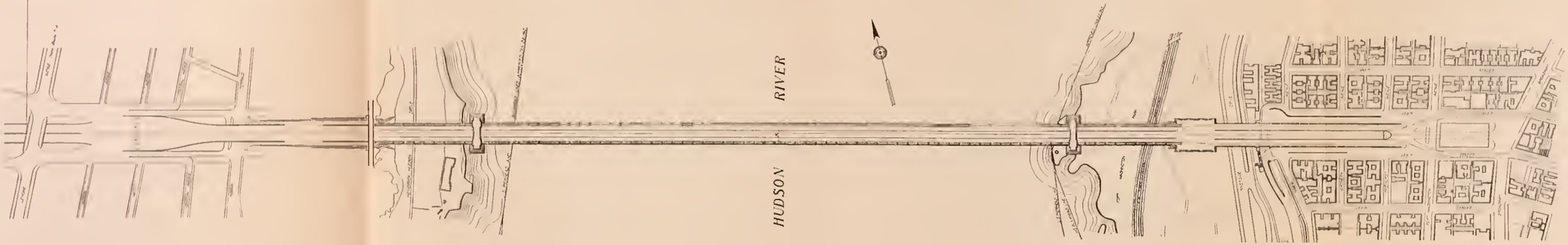
LOCATION MAP
OF
BRIDGE AND HIGHWAY APPROACHES

SCALE IN FEET 0 600 1200 1800





TRANSVERSE ELEVATION OF TOWER



THE PORT OF NEW YORK AUTHORITY

HUDSON RIVER BRIDGE

FORT WASHINGTON - FORT LEE

GENERAL PLAN AND ELEVATION